

SEQUENCE LISTING

<110> Zhang, Lian Hui
Lin, Yi Han
Xu, Jin Liang

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<140> 10/502351

<141> 2004-07-23

<150> PCT/SG02/000011

<151> 2002-01-23

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Ile Pro His Ile Arg Ala Asn Asp Tyr Ala Ser Leu Gly Tyr Gly Met
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Ala Tyr Ala Tyr Ala Gln Asp Asn Leu Cys Leu Leu Ala Asp Gln Val
 65 70 75 80

Val Thr Val Asn Gly Glu Arg Ser Lys Thr Phe Gly Pro Glu Gly Thr
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Val Thr Val Ser Phe Lys Pro Ile Pro Asn Leu Gln Ser Asp Ala Phe
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Phe Lys Gly Ile Phe Asp Glu Asp Gly Leu Arg Ala Gly Tyr Ala Gln
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Gly Ile Val Ala Ala Gln Pro Pro Gly Arg Thr Pro Val Ala Glu Arg
 195 200 205

Glu Ile Pro Pro Gln Ala Val Asp Thr Val Ala Leu Asp Arg Glu Leu
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Gln Leu Arg Asp Met Pro Ile Gly Ser Asn Gly Trp Ala Phe Gly Ala
 225 230 235 240

Asp Ala Thr Ala Asn Arg Arg Gly Val Leu Leu Gly Asn Pro His Phe
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Pro Trp Thr Thr Thr Asn Arg Phe Tyr Gln Val His Leu Thr Val Pro
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Gly Lys Leu Asp Val Met Gly Ala Ser Ile Ala Ala Phe Pro Val Val
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Ser Ile Gly Phe Asn Lys Asp Val Ala Trp Thr His Thr Val Ser Thr
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Val Ala Phe Asp Val Lys Leu Pro Asp Gly Arg Leu Glu Arg Arg Thr
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His Thr Phe Tyr Asp Thr Ile Tyr Gly Pro Val Leu Ser Met Pro Ser
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Gly Gly Met Pro Trp Thr Thr Gln Lys Ala Tyr Ala Leu Arg Asp Ala
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Asn Arg Asn Asn Thr Arg Ser Val Asp Ser Trp Leu His Ile Gly Gln
 385 390 395 400

Ala Arg Asp Val Ala Gly Ile Arg Gln Ala Ile Gly Asn Leu Gly Ile
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Pro Trp Val Asn Thr Ile Ala Thr Asp Arg Asn Gly Arg Ala Leu Phe
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Ala Asp Val Ser Thr Thr Pro Asp Val Pro Ala Ala Glu Leu Gln Arg
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Leu Val Leu Gly Asp Leu Leu Ala Ala Cys Lys Ala Thr Pro Ala Pro
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Ala Asp Pro Val His Thr Pro Arg Gly Leu Arg Met Asn Asp Ala Thr
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Arg Lys Ala Gly Phe Ala Leu Asp Ala Pro Leu Gly Thr Val Gln Ala
675 680 685

Ala His Ala Pro Asp Gly Ser Ile Ala Leu His Gly Gly Glu Glu Tyr
690 695 700

Glu Gly Val Leu Asn Lys Leu Gln Thr Leu Pro Ile Gly Pro Lys Gly
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Leu Pro Val Tyr Phe Gly Thr Ser Tyr Ile Gln Thr Val Thr Phe Asp
725 730 735

Asp Gln Gly Pro Val Ala Asp Ala Ile Leu Thr Tyr Gly Glu Ser Thr
740 745 750

Asp His Ala Ser Pro His Ala Phe Asp Gln Met Arg Ala Tyr Ser Gly
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35 40 45

His Ile Gln Ala Ser Asp Leu Gly Gly Ile Gly Tyr Gly Val Gly Tyr
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Ser Tyr Ala Gln Asp Asn Leu Cys Leu Leu Ala Asp Gln Val Met Thr
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Val Arg Gly Glu Arg Ser Lys Phe Leu Gly Ala Glu Gly Lys Thr Val
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Val Gly Phe Gln Pro Val Asn Asn Leu Asp Ser Asp Val Phe Phe Lys
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Thr Val Ile Glu Pro Gly Arg Leu Gln Ala Gly Tyr Arg Asp Gln Pro
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Gln Ile Leu Ala Leu Met Arg Gly Tyr Val Ala Gly Val Asn Arg Tyr
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Leu Arg Asp Thr Pro Pro Glu Gln Trp Pro Ser Ala Cys Arg Asn Ala
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Asp Trp Val Arg Pro Leu Thr Glu Leu Asp Val Met Arg Leu Gly Glu
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Glu Lys Ala Ile Gln Ala Ser Ala Gly Ala Met Val Ser Ala Ile Thr
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Ser Ala Arg Pro Pro Gln Ala Gly Ala Ser Thr Ala Ala Pro Arg Pro
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Asp Leu Ala Ala Phe Asn Arg Gln Tyr Arg Phe Asn Asp Leu Pro Ile
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Gly Leu Leu Leu Gly Asn Pro His Phe Pro Trp Glu Thr Ser Asn Arg
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Phe Tyr Gln Leu His Leu Thr Leu Pro Gly Gln Phe Asp Val Met Gly
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Val Ala Trp Thr His Thr Val Ser Thr Asp Lys Arg Phe Thr Leu Ala
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Ala Leu Thr Leu Val Pro Gly Asp Pro Leu Ser Tyr Val Lys Asp Gly
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Gln Gln Arg Arg Leu Gln Arg Arg Thr Ala Val Ile Glu Val Lys Thr
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Ala Asn Gly Pro Arg Leu His Thr Arg Thr Val Tyr Phe Thr Pro Glu
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Gly Pro Leu Val Asn Leu Pro Ala Ala Gly Leu Thr Trp Thr Pro Gln
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Tyr Ala Phe Ala Leu Arg Asp Ala Asn Arg Asn Asn Thr Arg Met Leu
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Ala Thr Trp Leu Gly Phe Ala Gly Ala Lys Ser Val Arg Asp Ile Arg
 385 390 395 400

Ala Ser Leu Asn Val Gln Gly Ile Pro Trp Val Asn Thr Ile Ala Ala
 405 410 415

Asp Arg Ala Gly Ser Ala Leu Tyr Ala Asp Ile Ser Ser Ser Pro Asn
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Val Ser Ala Ala Gln Gln Gln Ala Cys Thr Pro Pro Pro Leu Ala Pro
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Leu Phe Pro Ala Ala Gly Leu Ala Val Leu Asp Gly Ser His Ser Ala
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Cys Asp Trp Lys Thr Asp Pro Ala Ser Arg Val Pro Gly Leu Arg Ala
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Pro Asp Lys Met Pro Val Leu Ile Arg Gln Asp Phe Val Ala Asn Ser
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Asn Asn Ser Ala Trp Leu Ala Asn Pro Ala Ala Pro Gln Thr Gly Leu
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Pro Gly Arg Thr Phe Asp Ile Pro Thr Leu Gln Ala Thr Leu Leu Arg
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Trp Arg Glu Phe Trp Arg Arg Ala Arg Ala Ile Pro Asn Val Tyr Ala
610 615 620

Val Pro Phe Asp Pro Ala Asp Pro Val Asn Thr Pro Arg Gly Leu Asn
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Thr Ala Asp Pro Ala Ala Gln Thr Ala Leu Leu Gly Ala Leu Arg Glu
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Ala Ala Ala Ala Leu Thr Ala Ala Gly Ile Pro Phe Asp Ala Pro Leu
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Gly Glu Val Gln Gly Val Val Arg Gly Gly Asp Phe Ile Ser Leu Pro
675 680 685

Gly Gly Ala Glu Phe Glu Gly Val Leu Asp Lys Ile Asp Phe Asn Pro
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Leu Ala Pro Gly Gly Tyr Arg Gly Val Val Gly Asn Ala Ser Ser Tyr
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Ile Gln Thr Val Gly Phe Thr Asp Ser Gly Val Gln Ala Glu Ala Val
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Leu Thr Tyr Ser Gln Ser Ser Asn Pro Glu Ser Pro Tyr Phe Ser Asp
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Gln Thr Arg Leu Phe Ser Arg Ser Glu Trp Val Lys Leu Pro Phe Thr
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Glu
785

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His Asp Gly Gly Tyr Ala Ala Leu Ile Arg Arg Ala Ser Tyr Gly Val
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Pro His Ile Thr Ala Asp Asp Phe Gly Ser Leu Gly Phe Gly Val Gly
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Tyr Val Gln Ala Glu Asp Asn Ile Cys Val Ile Ala Glu Ser Val Val
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Thr Ala Asn Gly Glu Arg Ser Arg Trp Phe Gly Ala Thr Gly Pro Asp
85 90 95

Asp Ala Asp Val Arg Thr Thr Ser Ser Thr Gln Ala Ile Asp Asp Arg
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Val Ala Glu Arg Leu Leu Glu Gly Pro Arg Asp Gly Val Arg Ala Pro
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Cys Asp Asp Val Arg Asp Gln Met Arg Gly Phe Val Ala Gly Tyr Asn
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His Phe Leu Arg Arg Thr Gly Val His Arg Leu Thr Asp Pro Ala Cys
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Arg Gly Lys Ala Trp Val Arg Pro Leu Ser Glu Ile Asp Leu Trp Arg
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Thr Ser Trp Asp Ser Met Val Arg Ala Gly Ser Gly Ala Leu Leu Asp
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Gly Ile Val Ala Ala Thr Pro Pro Thr Ala Ala Gly Pro Ala Ser Ala
 195 200 205

Pro Glu Ala Pro Asp Ala Ala Ala Ile Ala Ala Ala Leu Asp Gly Thr
 210 215 220

Ser Ala Gly Ile Gly Ser Asn Ala Tyr Gly Leu Gly Ala Gln Ala Thr
 225 230 235 240

Val Asn Gly Ser Gly Met Val Leu Ala Asn Pro His Phe Pro Trp Gln
 245 250 255

Gly Ala Glu Arg Phe Tyr Arg Met His Leu Lys Val Pro Gly Arg Tyr
 260 265 270

Asp Val Glu Gly Ala Ala Leu Ile Gly Asp Pro Ile Ile Glu Ile Gly
 275 280 285

His Asn Arg Thr Val Ala Trp Ser His Thr Val Ser Thr Ala Arg Arg
 290 295 300

Phe Val Trp His Arg Leu Ser Leu Val Pro Gly Asp Pro Thr Ser Tyr
 305 310 315 320

Tyr Val Asp Gly Arg Pro Glu Arg Met Arg Ala Arg Thr Val Thr Val
 325 330 335

Gln Thr Gly Ser Gly Pro Val Ser Arg Thr Phe His Asp Thr Arg Tyr
 340 345 350

Gly Pro Val Ala Val Val Pro Gly Thr Phe Asp Trp Thr Pro Ala Thr
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Ala Tyr Ala Ile Thr Asp Val Asn Ala Gly Asn Asn Arg Ala Phe Asp
 370 375 380

Gly Trp Leu Arg Met Gly Gln Ala Lys Asp Val Arg Ala Leu Lys Ala
 385 390 395 400

Val Leu Asp Arg His Gln Phe Leu Pro Trp Val Asn Val Ile Ala Ala
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Asp Ala Arg Gly Glu Ala Leu Tyr Gly Asp His Ser Val Val Pro Arg
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Val Thr Gly Ala Leu Ala Ala Ala Cys Ile Pro Ala Pro Phe Gln Pro
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Leu Tyr Ala Ser Ser Gly Gln Ala Val Leu Asp Gly Ser Arg Ser Asp
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Cys Ala Leu Gly Ala Asp Pro Asp Ala Ala Val Pro Gly Ile Leu Gly
 465 470 475 480

Pro Ala Ser Leu Pro Val Arg Phe Arg Asp Asp Tyr Val Thr Asn Ser
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Asn Asp Ser His Trp Leu Ala Ser Pro Ala Ala Pro Leu Glu Gly Phe
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Pro Arg Ile Leu Gly Asn Glu Arg Thr Pro Arg Ser Leu Arg Thr Arg
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Pro Gly Lys Gly Phe Thr Thr Ala Arg Leu Trp Gln Val Met Phe Gly
 545 550 555 560

Asn Arg Met His Gly Ala Glu Leu Val Arg Asp Asp Leu Val Ala Leu
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Cys Arg Arg Gln Pro Thr Ala Thr Ala Ser Asn Gly Ala Ile Val Asp
580 585 590

Leu Thr Ala Ala Cys Thr Ala Leu Ser Arg Phe Asp Glu Arg Ala Asp
595 600 605

Leu Asp Ser Arg Gly Ala His Leu Phe Thr Glu Phe Leu Ala Gly Gly
610 615 620

Ile Arg Phe Ala Asp Thr Phe Glu Val Thr Asp Pro Val Arg Thr Pro
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Asp Ile His Thr Asp Ser Arg Gly Glu Arg Arg Ile Pro Ile His Gly
675 680 685

Gly Arg Gly Glu Ala Gly Thr Phe Asn Val Ile Thr Asn Pro Leu Val
690 695 700

Pro Gly Val Gly Tyr Pro Gln Val Val His Gly Thr Ser Phe Val Met
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Ala Val Glu Leu Gly Pro His Gly Pro Ser Gly Arg Gln Ile Leu Thr
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Tyr Ala Gln Ser Thr Asn Pro Asn Ser Pro Trp Tyr Ala Asp Gln Thr
740 745 750

Val Leu Tyr Ser Arg Lys Gly Trp Asp Thr Ile Lys Tyr Thr Glu Ala
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Gly Arg
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Asp Ile Arg Trp Thr Ala Tyr Gly Val Pro His Ile Arg Ala Lys Asp
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Glu Arg Gly Leu Gly Tyr Gly Ile Gly Tyr Ala Tyr Ala Arg Asp Asn
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Ala Cys Leu Leu Ala Glu Glu Ile Val Thr Ala Arg Gly Glu Arg Ala
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Arg Tyr Phe Gly Ser Glu Gly Lys Ser Ser Ala Glu Leu Asp Asn Leu
 100 105 110

Pro Ser Asp Ile Phe Tyr Ala Trp Leu Asn Gln Pro Glu Ala Leu Gln
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Ala Phe Trp Gln Ala Gln Thr Pro Ala Val Arg Gln Leu Leu Glu Gly
 130 135 140

Tyr Ala Ala Gly Phe Asn Arg Phe Leu Arg Glu Ala Asp Gly Lys Thr
 145 150 155 160

Thr Ser Cys Leu Gly Gln Pro Trp Leu Arg Ala Ile Ala Thr Asp Asp
 165 170 175

Leu Leu Arg Leu Thr Arg Arg Leu Leu Val Glu Gly Gly Val Gly Gln
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Phe Ala Asp Ala Leu Val Ala Ala Ala Pro Pro Gly Ala Glu Lys Val
195 200 205

Ala Leu Ser Gly Glu Gln Ala Phe Gln Val Ala Glu Gln Arg Arg Gln
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Arg Phe Arg Leu Glu Arg Gly Ser Asn Ala Ile Ala Val Gly Ser Glu
225 230 235 240

Arg Ser Ala Asp Gly Lys Gly Met Leu Leu Ala Asn Pro His Phe Pro
245 250 255

Trp Asn Gly Ala Met Arg Phe Tyr Gln Met His Leu Thr Ile Pro Gly
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Arg Leu Asp Val Met Gly Ala Ser Leu Pro Gly Leu Pro Val Val Asn
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Ile Gly Phe Ser Arg His Leu Ala Trp Thr His Thr Val Asp Thr Ser
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Ser His Phe Thr Leu Tyr Arg Leu Ala Leu Asp Pro Lys Asp Pro Arg
305 310 315 320

Arg Tyr Leu Val Asp Gly Arg Ser Leu Pro Leu Glu Glu Lys Ser Val
325 330 335

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340 345 350

Lys Val Tyr Gln Ser Ile Tyr Gly Pro Leu Val Val Trp Pro Gly Lys
355 360 365

Leu Asp Trp Asn Arg Ser Glu Ala Tyr Ala Leu Arg Asp Ala Asn Leu
370 375 380

Glu Asn Thr Arg Val Leu Gln Gln Trp Tyr Ser Ile Asn Gln Ala Ser
385 390 395 400

Asp Val Ala Asp Leu Arg Arg Arg Val Glu Ala Leu Gln Gly Ile Pro
405 410 415

Trp Val Asn Thr Leu Ala Ala Asp Glu Gln Gly Asn Ala Leu Tyr Met
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Asn Gln Ser Val Val Pro Tyr Leu Lys Pro Glu Leu Ile Pro Ala Cys
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Ala Ile Pro Gln Leu Val Ala Glu Gly Leu Pro Ala Leu Gln Gly Gln
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Asp Ser Arg Cys Ala Trp Ser Arg Asp Pro Ala Ala Ala Gln Ala Gly
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485 490 495

Gln Asn Ser Asn Asp Ser Ala Trp Leu Thr Asn Pro Ala Ser Pro Leu
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Gln Gly Phe Ser Pro Leu Val Ser Gln Glu Lys Pro Ile Gly Pro Arg
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Lys Thr Leu Glu Glu Met Val Thr Ala Asn His Val Phe Ser Ala Asp
545 550 555 560

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565 570 575

Lys Ser Leu Ala Arg Ala Cys Ala Ala Leu Ala Gln Trp Asp Arg Gly
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Ala Asn Leu Asp Ser Gly Ser Gly Phe Val Tyr Phe Gln Arg Phe Met
595 600 605

Gln Arg Phe Ala Glu Leu Asp Gly Ala Trp Lys Glu Pro Phe Asp Ala
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Gln Arg Pro Leu Asp Thr Pro Gln Gly Ile Ala Leu Asp Arg Pro Gln
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Val Ala Thr Gln Val Arg Gln Ala Leu Ala Asp Ala Ala Ala Glu Val
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Glu Lys Ser Gly Ile Pro Asp Gly Ala Arg Trp Gly Asp Leu Gln Val
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Ser Thr Arg Gly Gln Glu Arg Ile Ala Ile Pro Gly Gly Asp Gly His
675 680 685

Phe Gly Val Tyr Asn Ala Ile Gln Ser Val Arg Lys Gly Asp His Leu
690 695 700

Glu Val Val Gly Gly Thr Ser Tyr Ile Gln Leu Val Thr Phe Pro Glu
705 710 715 720

Glu Gly Pro Lys Ala Arg Gly Leu Leu Ala Phe Ser Gln Ser Ser Asp
725 730 735

Pro Arg Ser Pro His Tyr Arg Asp Gln Thr Glu Leu Phe Ser Arg Gln
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Gln Trp Gln Thr Leu Pro Phe Ser Asp Arg Gln Ile Asp Ala Asp Pro
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Gln Leu Gln Arg Leu Ser Ile Arg Glu
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<223> Reverse Primer for the QsbA gene

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32